CLAIMS

1. An antenna device having an open end, comprising:

four linear elements, each of which has a length equivalent to a half wavelength of an operating frequency, the elements being placed so that they may draw a diamond shape on a plane,

a feeding section that feeds power to one end of a first linear element and one end of a second linear element, the section being put at one of the apexes of a diamond shape,

a first delay section connected to the other end of the first linear element and one end of a third linear element for delaying the phase of an antenna current by a given phase,

a second delay section connected to the other end of the second linear element and one end of a fourth linear element for delaying the phase of an antenna current by the same phase as that of the first delay section, and

a reflector placed at a given distance in parallel to a plane, on which the linear elements have been placed.

2. The antenna device according to claim 1, wherein the first delay section and the second delay section have a length within a given range, the sections being linear elements having a bent form.

3. The antenna device according to claim 1, wherein

the first delay section and the second delay section are lumped constant parts.

4. The antenna device according to claim 1, comprising:

at least one director element having a length equivalent to a half wavelength or less, the director element being placed at a given distance from an open end of the linear element.

5. An antenna device, comprising:

two linear elements having the same length,

a bending part formed by bending the two linear elements at the centers of the elements with a length within a given range,

a feeding section connected to one end of the two linear elements to feed power, and

the reflector placed at a given distance in parallel to a plane containing the two linear elements,

wherein the two linear elements are bent and placed so that they draw a diamond shape, of which one side has a length equivalent to a half wavelength of an operating frequency and the other ends of the two linear elements are open.

6. An antenna device comprising:

a dielectric substrate with a given dielectric constant,

a conductor layer formed on the dielectric substrate,

a diamond-shape slot element formed on the conductor substrate, of which each side has a length equivalent to a half wavelength of an operating frequency,

the first delay section and the second delay section, which have been placed at each of opposite apex pairs of the diamond shape to delay the phase of an antenna current,

the feeding section, which have been placed on either of another one of the opposite apex pairs of the diamond shape, for feeding power to the slot elements,

a termination part formed at the other of another one of the opposite apex pairs of the diamond shape, for terminating the slot elements, and

the reflector placed beyond the substrate at a given distance from and in parallel to the conductor layer.

7. The antenna device according to claim 6, wherein the first delay section and the second delay section are the slot elements having a bent form with a length within the given range, which are formed on the conductor layer.

8. The antenna device according to claim 6, wherein the feeding section feeds power using a micro strip line laid on a rear plane of the substrate, on which the conductor layer has been formed.

9. The antenna device according to claim 6 comprising: at least one director slot element with a length equivalent to a half wavelength or less, which has been formed at a given distance from the termination part of the slot element.

10. A sector antenna device, wherein a plurality of antenna devices according to claim 1 are used, the antenna devices being placed on a plane while being shifted at equal angle from each other.

11. The antenna device according to claim 10, wherein six antenna devices have been placed in a row on a given rectangular plane, the six antenna devices being shifted by 60° from each other.